Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	**ET Docket No. 02–135**
SPECTRUM POLICY TASK FORCE REPORT	)	
Recommendations for Spectrum	)	
Policy Reform	)	
	)	

To: The Commission

COMMENTS OF ARRL, THE NATIONAL ASSOCIATION FOR AMATEUR RADIO, ON SPECTRUM POLICY TASK FORCE RECOMMENDATIONS

ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL), by counsel, hereby respectfully submits its comments in response to the *Public Notice*, FCC 02-322, released November 25, 2002, in which the Commission sought comments on the *Spectrum Policy Task Force Report* (SPTF Report) in the above-referenced docket proceeding. By further *Order* adopted December 10, 2002 (DA 02-3400), the Commission granted requests for extension of time to file comments and reply comments. These comments are therefore timely filed. With respect to the broad policy proposals contained in the SPTF Report, ARRL states as follows:

1. ARRL submitted comments to the Spectrum Policy Task Force (SPTF) July 8, 2002, in response to inquiries on specific topics preparatory to the SPTF Report. In its comments at that time, ARRL noted that it is an active participant in many of the Commission's proceedings involving spectrum allocations, and that it has from time to time expressed concern about certain of the Commission's policies and procedures for making important, and far-reaching domestic allocations decisions. ARRL has extensive experience in both international and domestic

allocation planning. It maintains staff dedicated to participation in international allocations conferences and the preparation meetings therefor, and members of its staff are regularly and consistently appointed to United States delegations to International Telecommunication Union (ITU) conferences. Domestically, ARRL actively participates in Commission rulemaking proceedings affecting Amateur Radio allocations. ARRL's laboratory staff and technical relations staff provide skilled engineering input into ARRL's comments and other submissions in such proceedings. Amateur Radio Service allocations are used by technically-inclined individuals for radio experimentation. The Amateur Service is an avocation that provides excellent opportunities for development and refinement of new technologies. Many licensees in the Amateur Service are professionally engaged in technical fields and have been responsible for much innovation in telecommunications research and development.

2. The SPTF Report portends far-reaching changes in allocation policy. Some of the recommendations are helpful to the future development of the Amateur Service, but others, candidly, are not. For example, flexible allocations policies may be increasingly facilitated through the use of software-defined radios in some circumstances, and by increasing use of listen-before-transmit protocols for certain devices in others. However, these tools are not universally applicable in all frequency ranges, and are not sufficient to permit compatible sharing among all types of radio services and uses. Nor are those technologies currently sufficiently mature to support sweeping changes in allocation policy at the present time. No one technology will, in all cases, render compatible those uses that are otherwise incompatible. The Commission is urged, overall, not to continue what appears to be a rush to judgment in abandoning the engineering-based allocations policies used in domestic allocation policymaking and planning for many years. The SPTF report proposes policies that are inappropriately comprehensive, and

there has been afforded insufficient time to study these matters in a thorough manner, much less to deploy them at present. The SPTF was not even formed until June of 2002, and the public comment that was received prior to the issuance on November 7, 2002 of the SPTF Report was not an adequate basis for adoption of the SPTF's work. The list of issues about which the SPTF asked for public comment was overbroad for a single round of input, provided on a very short timetable. Overall, ARRL asks that the Commission not adopt the SPTF report in toto, but rather use it as a basis for future planning on an ongoing basis. The SPTF Report is a useful tool to open a dialogue on future spectrum policy. Spectrum policy reform should be viewed as an ongoing process, not as a wholesale paradigm shift to be accomplished in half of a year.

3. Notwithstanding the foregoing, ARRL is encouraged that the process in this proceeding has involved the participation of all portions of the communications industry in developing spectrum policy. For years, ARRL has urged greater use in the Commission's processes of negotiated rulemaking, which is a very useful tool that can be used to expedite allocations decision making, and which encourages consensus decisions. Using negotiated rulemaking, the Commission can fine-tune allocations plans that will obviate the need for anything resembling the pejorative-termed "command and control" concept, in which the Commission imposes decisions on the industry. Negotiated rulemaking would solve one of the major current problems with the "command and control" allocations model, which is the need for the Commission to referee, or independently evaluate complex technical issues, and anticipate or predict electromagnetic compatibilities itself. Instead of acting as the judge and jury, the Commission could act as more of a facilitator among competitors for spectrum. In other words, there is every reason to expect that reform of what the Commission refers to as the "command and control" model for allocations is far preferable to abandonment or de-emphasis of the model,

and substitution of either a marketplace (exclusive) model, or a spectrum "commons" model for unlicensed device deployment. Another major concern with the "command and control" model is the slow speed at which allocations decisions are made. A negotiated rulemaking procedure would encourage much faster resolution of issues and result in finalized decisionmaking far quicker, and with less expenditure of Commission resources, than does the current administrative process used by the Commission.

4. Throughout the SPTF report, references are made to government and commercial services (and consumer demand for commercial services), as though those services were the only types of communications facilities under the Commission's jurisdiction. In fact, the majority of the licensees of the Commission are not commercial telecommunications service providers. They are, rather, private entities which utilize telecommunications as an incident of their own business or personal needs. This is true, for example, with PMRS licensees in the land mobile services; the Amateur Service; public safety licensees; and broadcast auxiliary and private fixed microwave licensees. Market-oriented (exclusive model) allocations policies are not, generally speaking, a neat fit in this context. Perhaps increasing use of band managers could push many of those private radio uses into a market-driven allocation system, but that is, in the last analysis, little more than privatization of a licensing function. The classification of the priority of private radio users in terms of the ability to pay band managers inevitably creates inequities. Some services, such as public safety and Amateur Radio, do not have the wherewithal to pay for access to spectrum.

5. Indeed, market-oriented allocation and assignment policies are completely inapplicable to the Amateur Service. The Amateur Service does not have the resources to compete in the marketplace for spectrum allocations. By definition, the nature of the Amateur Service excludes

the ability to compete economically for spectrum. The Service as a whole, and its individual licensees, have no money to pay for spectrum, or for licenses, to the extent necessary to be competitive with commercial entities bidding for access to the same spectrum. The value to the public of a vital, growing Amateur Radio Service, while perhaps only indirectly measurable in market terms, cannot translate to a marketplace ability to pay for spectrum. However, the Amateur Service provides invaluable public benefits, which Congress and the Commission have noted repeatedly: technical self-training and personal advancement in telecommunication skills; public service (including public safety interoperability) communications; disaster relief and emergency communications; and the fostering of international goodwill. These public benefits, which are irrelevant in the context of an exclusive model, market-driven allocation policy, would not survive even the "band manager" version of that policy. The band manager acquires spectrum commercially and has no economic incentive (nor regulatory incentive) to make spectrum available to the Amateur Service. ARRL does not believe that the band manager concept works well if more than one service is allocated in a specific band. For example, an Amateur band should not be shared with a commercial service where the latter is the band manager.

6. While market-oriented allocation processes may determine effectively which users occupy certain bands of spectrum, strict application of the policy would preclude Amateur Radio. However, using the real estate version of the exclusive model for spectrum allocation, Amateur allocations can as a corollary, be effectively viewed as set-asides for public use and benefit. Applying the concept of "public parks" or "public rights of way," Amateur Radio allocations would be set aside for use by and for the benefit of the general public, just as a public park or right-of-way is used by citizens collectively for beneficial purposes available to all.

Because of Amateur Radio's wide availability to the general public, with only minimal entry qualifications requirements, and given its proven value as an educational, diplomatic, and public service resource, the public park or right-of-way concept would be a workable corollary to a marketplace allocation policy. Amateur Radio is essentially the public park of the radio spectrum and is as necessary in telecommunications development and advancement as are the national parks to land use in the United States.

7. The SPTF Report addressed certain government spectrum issues, but the allocation models urged in the Report do not apply, in general, to spectrum shared between Government and Amateur uses. The Amateur Service is a compatible sharing partner with the Federal government in many allocations, especially above 420 MHz. In fact, almost all of the Amateur allocations above 420 MHz are shared Government allocations. The Amateur Service allocation status is typically secondary to Government uses. This sharing situation works very well, and provides a means of deriving maximum efficiency from Government allocations. ARRL's relationship with NTIA is generally cooperative and based on a longstanding ability to work together to avoid interference in shared allocations. NITA explained the compatibility between Government and Amateur Radio uses concisely in its February, 1995 *Spectrum Reallocation Final Report*, at Appendix B, page B-2, as follows (footnotes omitted):

> The Amateur Service has successfully co-existed with Federal fixed, mobile and radiolocation services (i.e. radar) for nearly fifty years. As indicated in many of the public comments on the Preliminary Report and the FCC NOI, this sharing arrangement has been successful for both Federal and amateur spectrum users. This success is primarily due to the fact that much of the Federal spectrum usage is located away from populated areas, minimizing potential interference as well as the amateur's ability to utilize the guard bands placed between different types of Federal services….

This having been said, there remains, from the perspective of the Amateur Radio Service, a need for the Commission and NTIA to cooperate more closely, and to develop a more unified

approach to spectrum management. Recently, in several different contexts, the Commission has made proposals involving Amateur allocations which, very late in the proceedings, are opposed by NTIA, for reasons largely left unexplained.[1] ARRL realizes that there are issues of national security inherent in allocations planning by Federal agencies served by NTIA. However, it is not at all useful for the Commission to make uncoordinated allocation decisions which are, at the last moment, scuttled by NTIA. NTIA's analyses continue, ARRL believes properly, to be premised on technical interference calculations. The SPTF report focuses largely on developing technology and increasing spectrum use efficiency as an allocations tool, which is not a panacea. Applied to Government spectrum, the SPTF concepts fail, because the goals are not the same. Commercial licensees seek to maximize the number of customers or users in a system while achieving a basic level of service quality. Government users, on the other hand, seek security, resistance to intentional interference, and link reliability. The goals are different, and therefore the allocation planning is different. Though not identical, the goals of the Amateur Service in use of allocations are complementary to the Government's interests. The Commission has, in the recent past, focused on unquantified predictions of market demand for certain new technologies as a means of making allocation decisions. Instead, it should focus on interference calculations relative to incumbent services, which is of more concern to Government users and the Amateur Service. A more unified, collegial approach to allocation planning between NTIA and the Commission is clearly called for, as is a recognition that the goals of Government and non-government commercial services are substantially different.

[1] The NTIA's evaluative processes for allocations proposals are essentially closed to non-government entities. The IRAC meetings are closed to the public; the minutes of IRAC meetings are confidential; and the process whereby issues are circulated by NTIA staff to served agencies for comment is an opportunity for obfuscation from the perspective of non-government spectrum users. The IRAC process is not substantially refereed. ARRL suggests that the process should be, at the least, coordinated more openly with Commission staff, so that sharing between government and non-government uses is facilitated to the greatest extent possible, consistent with protecting the Federal uses from interference.

8. The SPTF report identifies some interesting concepts intended to maximize use of spectrum, thus to alleviate the spectrum shortages that stem from strict division of allocations by frequency. Flexible use of spectrum is a useful concept in limited doses. However, this cannot be construed as a means of allowing total flexibility to provide any service under any technical parameters. This would result in attempted sharing by systems with radically different power, propagation needs and operating configuration, with inevitable interference potential and varying communications reliability. Any kind of service flexibility must be implemented within the constraints of clearly defined technical boundaries. There must in the end be a grouping of services with similar technical characteristics, including receiver sensitivity and selectivity.

9. ARRL supports, to a limited extent, the concept of "interference temperature" calculations and measurements, and therefore a determination of what types of spectrum overlays and compatible sharing partners can be added to an allocated band without degradation to incumbents. This concept, however, has substantial limitations, which are not adequately acknowledged in the SPTF report. First of all, the Commission has no reliable information at present regarding ambient noise levels in various environments, nor any collected data concerning interference susceptibility of receivers in various services. Especially in the context of unlicensed devices, there is no good data available as to aggregate noise levels. The Commission tends to evaluate interference potential from unlicensed devices in terms of point-source radiators, rather than in the aggregate. Evaluation of the effect on incumbents of adding users or devices to a band requires a prediction of the aggregate noise floor increase, or ambient noise levels, from those new users or devices. As a general principle, a service with a primary allocation would be allowed to increase the interference temperature for a secondary user, but unlicensed devices would not be allowed to do so with respect to any allocated service.

10. As it stands today, the concept of spectrum overlays based on a calculation of the interference temperature of a radio service is valid in theory only relative to some uses, and difficult or impossible to implement relative to others. It is most difficult in an essentially experimental-type radio service such as the Amateur Service, or in a passive service such as Radioastronomy. Amateur allocations support radically different types of communications, with widely-varying receiver sensitivities and selectivities. A segment of a band used for FM voice repeaters or wideband, error-correcting data communications, for example, might be expected to have a higher interference threshold than would a segment of that same band used for terrestrial or satellite, weak-signal narrowband communications using SSB. Because Amateur band segments used for certain types of communications vary from place to place throughout the country by local or regional band plan, there is no predictable method of determining what the "interference temperature" is in a given location in a given segment of an Amateur allocation.

11. This is not to say that the calculation of "interference temperature" by service isn't an important part of any compatibility determination. An example of a failing attempt at inter-service sharing which might have been alleviated by some predictive calculations is in the band 2400-2450 MHz, in which the Amateur Service has primary and secondary allocations, and the use of that band by unlicensed Part 15 devices. Under normal circumstances, the Amateur Service (an underlay user) is able to adapt to the use of those bands by individual Part 15 devices (the overlay users). However, in the past few years, the explosion in the use of that band by Part 15 devices, coupled with the Commission's increasingly relaxed rules on power, antenna gain and duty cycle of high-powered Part 15 devices has rendered the band unusable in some areas as the result of aggregate interference. This problem has escalated exponentially recently, largely due to unlicensed (and often illegally overpowered) Wi-Fi devices. Because interference from

unlicensed devices is, as a practical matter, impossible to remedy once the devices are deployed, the aggregate interference potential from such devices, and the interference temperature of the receivers in the underlay service, must be calculated in advance of creating the overlay in the first place.

12. The opportunities for improvement in spectrum efficiency are somewhat better with respect to determination of "white areas", where sharing in the temporal domain offers some expanded use of allocated bands. The Amateur Service is a good prototype for this concept, since it does not involve specific frequency assignments, and has always involved listen-before-transmit operating protocols. Live operators, as a matter of discipline and standard operating procedures, carefully listen before transmitting, and do so only after asking whether a frequency is clear. Amateur data networks utilize automated listen-before-transmit protocols and make extremely efficient re-use of frequencies in the time and geographic domains. Other services, such as the private land mobile service, could make far more efficient use of licensed spectrum by making use of the licensed channels on a similar basis. They should increase the use of trunking, or cognitive radio systems that will automatically select unused channels for link establishment. Once those technologies are more widely deployed, reduced reliance on individual frequency assignments is possible, and the land mobile services (as an example) can be as efficient in frequency re-use as is the Amateur Service now. In the meantime, increased reliance on real-time or advance private sector frequency coordination for fixed services, and smart transmitters for mobile operation, are possible. The Amateur Service has used informal, private-sector frequency coordination for many years for certain fixed Amateur stations, such as repeaters, beacons, data nodes, auxiliary stations, and remote base facilities. The broadcast auxiliary service (which also employs shared-frequency assignments) uses a similar, private

sector coordination program. Both are widely adhered to and accepted by individual licensees, recognizing that the process is in the best interests of all concerned. By contrast, the mandatory frequency coordination programs in the land mobile services and the fixed microwave service, which determine exclusive frequency assignments, is a constant source of difficulty, interference issues, and contentious disagreement between and among licensees and the coordinators. It is also an inefficient system, because of the amount of paper loading in the bands allocated to those services, and the unused capacity in those bands.

13. Amateurs have experimented with SDR technology for some years now. It is an exciting opportunity, and stands to greatly improve spectrum efficiency over the long term. It is not, however, a mature technology now, and it is not now a means of making reliable use of "white spaces" in allocated bands, whether due to geographic separation of assignments or because of underutilization of a channel in the time domain. SDR technology, and ultra-wideband technology, among others, is viewed by the SPTF as a means of increasing efficiency of allocations. Allocation policy should not be premised on anticipated advances in technology. It should await at least an initial maturation of such technology, at a time when it has been proven, and is reasonably available. ARRL would agree, however, that increasing use of error-correcting data communications will permit greater use of the time domain, in addition to maximizing use of the frequency and geographic domain. ARRL is proud of the pioneering work of Amateurs in designing and refining designs of error-correction data communications protocols.

14. ARRL's greatest concern with the SPTF Report is the reference therein to the third "spectrum rights" model: the "commons approach". The "exclusive use" approach, as discussed above, is in effect the marketplace allocation concept. What the SPTF refers to as the "limited

command and control" approach is the traditional allocation concept, which can be modified to improve efficiency by means of new technologies and concepts such as negotiated rulemaking. The "commons approach", however, is, according to the SPTF, to be used primarily in bands where scarcity is relatively low, and transaction costs are relatively high. The "commons model" has severe drawbacks, to the extent that it signals expanded (and essentially uncontrollable) deployment of unlicensed, Part 15 devices. It is not possible to allow unlimited numbers of unlicensed devices to occupy the same bands, unless the technical standards and etiquettes are appropriately determined in advance. The Commission has no ability to control the volume of deployed unlicensed devices, and therefore cannot control the aggregate interference levels from such devices, unless the technical limitations are appropriately determined in advance of such deployment. The situation described above at 2400-2450 MHz is a case in point.

15. The authority granted to Part 15 device manufacturers by the Commission is done normally based on consumer demand, rather than with an eye toward protection of incumbent users in the subject band. The typical scenario is that a device manufacturer or industry group petitions the Commission to change the rules to permit a new device or technology, which might have an impact on licensed users in the same band. The petitioner touts the device or technology in terms of benefits to the public, but submits nothing about the effect of the device on the level of use of the band, individually or in the aggregate. In such cases, the petitioner should have the burden of demonstrating the current state of use of the band, by its own technical calculations, computer models, or actual measurements in certain types of environments. The Commission does not place this burden on those petitioners, however. The Commission has inadequate information about the ambient noise environment. That is a situation that it must have a better handle on, in order to regulate the noise environment in a band in which unlicensed devices are

to be deployed. ARRL has commenced a "noise study" which, over time, will contribute to a better understanding about ambient noise conditions. The Commission's Technological Advisory Council (TAC) is conducting its own noise study. Without the results of those studies, however, which in order to be meaningful require that they be conducted over a substantial increment of time, the Commission cannot know whether its regulations governing licensed or unlicensed devices are overly restrictive, overly liberal, or properly balanced. Predictions can be made from computer models of aggregate noise levels from certain devices, and this is another area in which the proponent of a new device or technology should bear the burden of providing studies of both individual and aggregate interference potential and effect on ambient noise in applicable environments of the deployment of the advocated technology.

16. The real problem with the Spectrum Commons model and the increased deployment of unlicensed devices is that, as congestion in the "commons" rises, spectrum will not be put to its highest valued use.[2] ARRL is of the view that unlicensed devices cannot be authorized by the Commission under current statutes, unless the Commission finds that the devices do not have a significant interference potential to licensed radio services. This is because Section 301 of the Communications Act, which requires licensing, does not allow of any exceptions, and Section 307(e), which does create exceptions to individual licensing requirements, does not exempt RF devices generally. Therefore, notwithstanding the general enabling provision of Section 302(a) of the Communications Act, which gives the Commission the authority to make reasonable regulations governing the marketing and use of RF devices, the Commission does not possess the

[2] NB30 emission levels used in Europe are lower than Part 15 levels and are judged by Europeans to be levels at which no interference will occur to licensed radio services. Part 15 devices in the United States, however, use higher levels, which may under some circumstances cause interference, in which case the Part 15 device is supposed to stop transmitting. Once equipment is manufactured and sold, it is essentially impossible to recall and retrofit it. If the Commission were to mandate lower power levels such as in Europe, a spectrum commons model might be more practical.

jurisdiction to authorize RF devices for communications purposes without licenses. Because the purpose of Section 301 of the Communications Act is to avoid interference, the Commission could permit unlicensed devices which operate under conditions, such as low duty cycles, or low field strengths, such that they do not create a significant risk of interference to licensed radio services. Therefore, any expansion of the deployment of unlicensed devices is subject to the statutory limitation that the devices must be below the threshold at which they bear a substantial risk of interference to licensed radio services. The Commission already has pushed the Part 15 concept beyond the point that it works. Unlicensed devices should not be permitted to substitute for licensed fixed or mobile radio services, because to do so creates an unregulated environment where the devices, in the aggregate or individually, may preclude efficient use of the band by other services, or other unlicensed devices. Part 15 devices should be ancillary to those services, and should be used where, individually or in the aggregate, the devices do not preclude licensed, or other unlicensed devices, and operating parameters should be configured to achieve the same result.

17. As to enforcement, ARRL is in a unique position to offer support for the SPTF conclusion that efficient and reliable enforcement mechanisms to ensure regulatory compliance by all spectrum users are critical. Approximately four years ago, the Commission, after a long hiatus, brought visible enforcement to the Amateur Service. The plan of the Commission, developed by Mr. Richard Lee, then the Chief, Compliance and Information Bureau, was to create a sense of deterrence by increasing visibility of enforcement staff, without substantial expenditure of Commission resources. The plan was a resounding success. Mr. Lee, and his diligent agent, Riley Hollingsworth, Esquire, now of the Enforcement Bureau, returned the 680,000-licensee Amateur Service to its former status as a shining example of a rule-compliant

radio service, with exceptionally small expenditure or commitment of resources. Regardless of the allocation model used in an individual case, the deterrence-based compliance effort of the Enforcement Bureau in the Amateur Service should be duplicated in all radio services.

18. In summary, ARRL suggests that the SPTF Report is a positive first step in developing a comprehensive national approach to spectrum management. Its focus is oriented toward commercial services, and in that context the three principal allocation models make some sense. The Report does not provide mechanisms that are universally applicable, however, and standing alone, fails to address the needs and goals of the Amateur Radio Service. Government and non-government services which share spectrum, and especially the Amateur Service, require more traditional evaluative techniques. ARRL urges the Commission to establish a more collegial, and closer, working relationship with NTIA in developing allocations policies that address private radio uses better than those mechanisms discussed in the SPTF Report. Finally, ARRL urges the Commission, in the context of modernizing allocation procedures, to make increased use of negotiated rulemaking.

Therefore, the foregoing considered, ARRL, the National Association for Amateur Radio, respectfully requests that the Commission take these comments into account when taking further

steps toward improving the manner in which spectrum is used and regulated domestically, and in the development of an overall spectrum management strategy.

Respectfully submitted,

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January 27, 2003